Department of Toxic Substances Control

Edwin F. Lowry, Director
700 Heinz Avenue, Suite 200
Berkeley, California 94710-2721

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

N00217.000502
HUNTERS POINT
SSIC NO. 5090.3

July 19, 2001

Commanding Officer
Department of the Navy
Naval Facilities Engineering Command
Southwest Division
1220 Pacific Highway
San Diego, CA 92132-5190
Attention:Richard Mach

PARCEL D INFORMATION PACKAGE, PHASE II GROUNDWATER DATA GAPS INVESTIGATION, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Dear Mr. Mach:

California Department of Toxic Substances Control (DTSC) has completed its review of the above-mentioned document. We are very concerned with the quality of the document submitted. It requires significant more amount of time and massive comments to complete this review. We continue to encourage the Navy to strengthen its internal quality control efforts in producing documents that would lessen agency's burden in our reviews. Our comments are attached.

If you have any questions, Please contact me at (510) 540-3822.

Sincerely,

Chein Ping Kao, P.E.
Senior Hazardous Substance Engineer
Office of Military Facilities

Enclosure

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at www.dtsc.ca.gov.

Printed on Recycled Paper

CC: Ms. Claire Trombadore/Michael Work
US EPA Region IX
75 Hawthorne Street
San Francisco, California 94105-3901

Mr. Brad Job
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, California 94612

Ms. Amy Brownell
City and County of San Francisco
Department of Public Health
1390 Market Street, Suite 210
San Francisco, Ca 94102

Memorandum

Date: July 18, 2001
To: Chein Ping Kao, P.E., Project Manager
From: Eileen Hughes

Hunters Point Shipyard: Parcel D Information Package, Phase II Groundwater Data Gaps Investigation

At your request, I have reviewed: Parcel D Information Package, Phase II Groundwater Data Gaps Investigation, Hunters Point Shipyard, San Francisco, California, DS.0011.16327. The report, dated June 1, 2001, was prepared for Department of the Navy, Southwest Division, Naval Facilities Engineering Command, San Diego, California (Navy), by Tetra Tech EM Inc. The report was incomplete: missing pages were received by the Department of Toxic Substances Control (DTSC) on June 5, 2001.

Due to time constraints, site histories and soil results from the remedial investigation and from excavations were not evaluated with respect to groundwater results during this review.

General Comments/Summary of Concerns

1. Scope of Report. DTSC does not concur with the Navy's conclusions (for most locations) that the groundwater underlying Parcel D is of no significant risk to human health and the environment.

Since this is a data gaps report, the Navy should limit the discussion in the report to whether the contaminant is widespread or persistent, and whether the extent of contamination has been defined sufficiently for the FS. Conclusions related to risk assessment or to effects of pumping are not appropriate in this report (see comments on Section 4).

2. Risks for Groundwater. The human health risk assessment did not consider risks related to groundwater (with exception of groundwater to vapor at Buildings 406 and 411). This is a significant risk assessment data gap. This data gap should be addressed prior to the feasibility study (FS) addendum.

3. Criteria. Criteria should be provided for all analytes and for historic exceedences. Where maximum contaminant levels (MCLs) or National Ambient Water Quality Criteria (NAWQCs) do not exist, appropriate criteria should be discussed with the agencies. Some suggestions for criteria are provided (see comments on Table 4-1 and Section 4).

Plumes should be defined at the minimum by exceedences of risk-based criteria (not by Hunters Point Groundwater Ambient Levels, or HGALS).

4. "Background". References to "background" concentrations with respect to thallium (and elsewhere-e.g., nickel) are not appropriate and should be deleted. "Ambient" concentrations have been developed (HGALs), and these do not distinguish between "naturally" occurring and anthropogenic concentrations.

5. Continued monitoring

Chemical analytical testing. DTSC assumes that a monitoring program will be established in the future to address exceedences of criteria (see Comments on Section 4).

Water level measurements. Groundwater level measurements should continue on a regular basis. This is especially critical since groundwater flow in both aquifers is controlled by pumping systems (Pump Station A and Dry Dock 4) and by persistent, largely unexplained anomalies. Moreover, seasonal variations have not been fully measured in deeper zones and for well pairs.

6. Chromium VI (CrVI). CrVI is the major groundwater problem on Parcel D. Potential data gaps are identified for CrVI (see comments on Section 4). Recent sampling demonstrated that total chromium concentrations are due primarily to CrVI. Although, currently, there is no state or federal maximum contaminant level (MCL) for CrVI, a California MCL is under discussion, and the California public health goal (PHG) for tap water is .2 ug/L. The California modified preliminary remedial goal (PRG) in tap water is .16 ug/L. The Navy's use of the aquatic criteria (50 ug/L) as a screening criteria is not sufficiently conservative for potential human health risks.

7. Well pairs. In general, the hydrologic relationship between aquifers is not fully understood. In two cases, contaminants are shared between well pairs (i.e., IR34MW37A/B have nickel and thallium and IR09MW25A/55B have nickel). The extent of contaminants in the deeper zone is unknown, and it can not be assumed that the measurements taken represent maximum concentrations. Chemical analytical testing of well pairs should continue. Because there are few wells in deeper zones and the groundwater flow regime is not defined, it would be prudent to analyze paired wells for a full suite of analytes.

A spider map should be prepared showing chemical analytical results for all paired wells. Paired wells on other parcels but proximate to Parcel D should be included, along with bedrock wells. Chemical results for deeper wells on other parcels that are proximate to Parcel D should be included.

8. Deeper zones. Potentiometric contour map(s) for the deeper zones(s) should be prepared. Wells from adjacent parcels that are proximate to Parcel D should be included.

9. Data gaps. Potential data gaps are identified (see comments under Section

4).

10. Condition of wells. Table 2-1 should be revised for Parcel D wells and a Well Report should be prepared for all wells at Hunters Point (see comments on Section 2.1 and 5.1, and Table 2-1). A protocol for correcting well problems should be established (see Appendix A comments).

11. Cross sections. The hydrogeological cross sections should be revised (see comments on Figure 3-2).

12. Hunters Point groundwater ambient levels (HGALs) have not been developed for the B aquifer. As the data set grows, HGALs should be developed for deeper zones.

13. Well decommissioning. It was DTSC's understanding that wells for decommissioning would be proposed by the Navy to the agencies prior to decommissioning. Why was this process not followed? Several wells have been decommissioned without regulatory review.

14. Soil sources. From the information presented in this report, it is not possible to ascertain whether soil source areas for groundwater contamination have been identified or remediated. To aid in the evaluation of groundwater results, site histories and soil contaminants should be summarized.

15. Pathways. The soil to vapor (e.g., for VOCs) and the soil to groundwater pathways have not been considered during the data gaps evaluation.

16. HGALs and risks. Concentrations which exceed risk-based criteria but which are less than HGALs are common (As, Be, Mn, Sb, etc.). That is, a potential risk may be associated with HGALs in groundwater.

17. Salt water intrusion. The Navy says that pumping at various locations would not be acceptable since it may lead to salt water intrusion. However, significant pumping has been conducted at Parcel D for many years now. Is the current pumping at Pump Station A and Dry Dock 4 contributing to salt water intrusion?

18. QA/QC. A quality assurance/quality control (QA/QC) section should be included.

19. Detection limits (DLs). In general, the effect of high DLs on the definition of plumes and data gaps has not been fully discussed.

20. Data presentation. In this report, contaminants are displayed on figures on a per contaminant basis. While this is useful is many ways, spider maps with multiple contaminants displayed should be provided. These are the preferred method for data presentation (as in the remedial investigation (RI) report) because, for example, risks due to multiple contaminants and chemical associations are more readily discerned in the RI-style data presentation.

The time required to do this review was extensive because of the lack of RI-style data presentation.

21. Non-aqueous phase liquids (NAPLs). A figure should be included indicating the extent of NAPLs. Although remediation of petroleum compounds is conducted under the authority of the Regional Water Quality Control Board (RWQCB), the extent of NAPLs is germane to this investigation, since NAPLs may serve as a carriers/cosolvents for other compounds.

Specific Comments

1. Section 2.1: Well Condition and Well Repair. Please provide a well condition report for all wells on Hunters Point, to include: well installation/decommissioning logs, revised Figure 2-1, and revised Tables 2-1s (see comments below on figures and tables) for all parcels.

Questions related to specific wells are provided in Appendix A comments.

2. Section 2.2: Groundwater Level Measurement. The number of wells used base-wide are cited. Please cite the number of wells measured/sampled in Parcel D.

Were water level measurements corrected for NAPL?

3. Section 3.1: Stratigraphy and Lithology.

3.1 Additional comments on stratigraphy are provided under Figure 3-2.

3.2 Section 3.1.2 colluvium may be present adjacent to bedrock: generally, colluvium is not discussed.

3.3 Include geologic time period in Section 3.1.5.

3.4 Serpentinite is the dominant bedrock on Parcel D. However, other bedrock identified in logs should be noted (e.g., shale, sandstone, greenstone).

4. Section 3.2: Hydrostratigraphy

4.1 Aquifer characteristics. Aquifer characteristics (e.g., vertical and horizontal gradients, hydraulic conductivity, etc.) should be summarized. Results of pump tests and hydraulic conductivity tests should be summarized and evaluated. Results of some recent tests are provided in Appendix A: these should be evaluated and compared to historic results.

4.2 Nomenclature and aquifer interpretation. Well naming conventions are not

consistent with aquifer interpretations. If the B aquifer is defined as located in the undifferentiated sediments (Qu) beneath the bay mud (Qbm), then wells screened in Bay Mud are aquitard wells (not B wells), and the "B" signifier in the well name is misleading. For example, IR37MW26B and IR09MW54B are screened in Bay Mud and IR34MW36B is screened primarily in Qbm, at the contact between Qbm and the underlying undifferentiated sediments (Qu). Similarly, two "bedrock" wells (with "F" signifiers in the well name) are considered in this report as A aquifer wells, which is confusing.

4.3 Wells re-assigned based on hydraulic connectivity. In the text (Section 3.2.1), "F" wells IR09MW45F and IR09MW51F (in "fractured bedrock") are "considered to be A-aquifer wells" because they are "hydraulically connected to the A aquifer" and "because no aquitard zone separates" A-aquifer sediments and bedrock. Other wells in the A aquifer are in Quarternary undifferentiated upper sands (Quus). Wells should be assigned to the same aquifer when they have identical aquifer characteristics (e.g., hydraulic conductivity)--not when they are "hydraulically connected".

To clarify this situation, the Navy should demonstrate when/where aquifer characteristics are identical, then re-name wells accordingly. For example, wells screened in Qbm should be re-named as aquitard wells.

4.4 B aquifer. The Navy's conclusion that no extensive B aquifer zone can be identified is not fully supported, considering that the B aquifer has not been explored under a large portion of the site.

4.5 Bedrock. Bedrock should be included as a separate hydrostratigraphic zone. The report should note that bedrock is largely unexplored at the site.

4.6 Recharge/discharge zones for A and B aquifers should be discussed in this section.

4.7 Groundwater divide. What is the basis for designating the mound (at IR55MW04A, PA50MW05A, PA16MW17) as a groundwater divide? Has leakage been ruled out?

4.8 Groundwater mound. The persistent groundwater high at IR44MW08A is unexplained. Has leakage from water lines been checked in the field?

4.9 Groundwater sink. The persistent groundwater low at IR38 is unexplained. The stratigraphy deeper than the shallow wells in this area has not been investigated. This area is a candidate for additional exploration, including installation of a B aquifer well. At the minimum, continued monitoring is recommended.

4.10 To facilitate evaluation of groundwater measurements., rainfall hydrographs should be provided.

5.0 Section 3.3: Groundwater flow patterns

5.1 Pump Station A. The widespread effect of Pump Station A on the shallow aquifer is clearly shown by depressed groundwater contours over several events. The effect on deeper zones is not clear.

Dry Dock 4. Pumping at Dry dock 4 is cited as a possible cause of the downward vertical gradients measured at well pairs IR34MW36A/B and IR34MW37A/B. The full extent of the effect of the pumping is not known.

Pump Station A and Dry Dock 4 pump station appear to be functioning as pump and treat systems. Will these pump stations be maintained in perpetuity? Why is pumping necessary at Dry Dock 4?

Please provide more information on the pump stations, including: drawings, pumping rates, discharge volumes, and chemical analytical results for discharge permits. Are all the contaminants in groundwater (including CrVI) tested for? A model should be constructed and capture zones under different scenarios estimated. Additional wells/piezometers may be required to determine the extent of influence of pumping at Pump Station A and Dry Dock 4.

Are there any other pumping systems at Parcel B?

5.2 Horizontal gradients for each aquifer should be calculated and discussed.

5.3 B aquifer. A figure showing the potentiometric surface of the B aquifer should be provided. Wells that are actual B-aquifer wells (i.e., screened in Qu) should be listed in the discussion on B aquifer zones (Sections 3.2.3 and 3.3). The effect of pumping on the B aquifer has not been fully determined.

5.4 Bedrock. The section should note that the bedrock is largely unexplored.

5.5 Figures showing groundwater (or potentiometric) contours should indicate the historic shoreline, historic seawalls, historic or current creeks or seeps, and tidal zones.

6.0 Section 3.4: Preliminary Evaluation of Potential Communication between Aquifers

6.1 Pump Tests. Results of pump tests are germane to the issue of communication between aquifers and should be summarized in this section. Has a full scale pump test ever been conducted?

6.2 Vertical Gradients. The test should discuss whether vertical gradients are persistent or exhibit any pattern, by evaluating current results with respect to historic results.

7.0 Section 4.0: Groundwater Contamination

7.1 General Comment on the Navy's Approach

"Other factors" are discussed in this section (page 4-3 and elsewhere), in a manner reminiscent of the risk management process for soil investigations. This, however, is a data gaps investigation, and should be treated as such.

"Other factors" include, for example, whether the Navy believes that exceedences are of significant risk to human health or the environment, or whether pumping at a location may cause salt water intrusion.

Potential salt water intrusion and other effects of existing pumping systems and of future/temporary pumping systems (e.g., for groundwater control during site development) should be discussed in the feasibility study (FS), and are not

appropriate here.

Conclusions regarding whether a risk is significant are also not appropriate here. First, significant risks are formally identified in a risk assessment. However, human health risks related to groundwater have not yet been evaluated in a risk assessment because the groundwater was previously considered to be of no beneficial use. Second, in many cases wells have not been resampled (and/or the data set has not changed substantially) since the draft final FS. Third, the soil to groundwater pathway has not been evaluated with respect to human health risks.

The Navy should limit the discussion in the report to whether the contaminant is widespread or persistent, and whether the extent of contamination has been defined sufficiently for the FS addendum. DTSC's comments follow this path.

It has been noted previously that some of the data is old: some data points have not been revisited since 1991, 1995, or 1996. Moreover, the data set for some sampling points is too small to show seasonal variation.

Further, DTSC assumes that a monitoring program will be established in the future as part of the remedial action, to track exceedences of risk-based criteria. The monitoring program will take into consideration issues raised in the FS (e.g., pumping) and determinations of the Regional Water Quality Control Board (RWQCB) regarding aquifer uses and designations. Specific monitoring recommendations are not provided in these comments.

DTSC will generally not comment on the "other factors" cited in this report. Lack of comment does not signify concurrence with the Navy's conclusions, or the Navy's interpretations of "other factors".

7.2 Plumes. Plumes are properly defined as all hits above detection limits (DLs), and DLs are required to be below risk-based criteria). The preferred data presentation would show plumes delineated by results greater than DLs (i.e., non-detected results, or NDs), with additional contours (say in a different color) indicating risk-based criteria and HGALs.

However, for the purposes of this data gap investigation, plumes drawn for exceedences of risk-based criteria will suffice as a simplification. With this simplification, the actual plumes will be under-represented on the figures. The shapes of the plumes may also be different. And larger plumes may erroneously be delineated as one or more small plumes (e.g., copper, nickel, thallium).

HGALs should be used when HGALs are lower than risk-based criteria (e.g., barium). Please correct figures accordingly (e.g., antimony, cadmium, copper, lead, nickel).

Plumes are also properly defined only for samples collected contemporaneously. In this report, samples from various events are used to draw plumes which may lead to errors.

Plumes are not drawn by the Navy for locations where only one measurement has been taken. This approach is not acceptable. Plumes should be

drawn for these data. Alternatively, the Navy can collect more data.

Bedrock wells IR09MW45F and 51F are not fully discussed in the text, and exceedences are not drawn as plumes on figures.

How are high DLs treated during plume delineation?

7.3 Contract Laboratory Program (CLP) metals. The list of analytes for "CLP metals" analysis should be included.

7.4 Section 4.2. Please use the familiar term "National Ambient Water Quality Criteria (NAWQC)".

7.5 Aluminum (Al). Al concentrations increased to 53,800 ug/L (and Fe was measured at 77,300 ug/L) in recent sampling at IR34MW01A. The PRG for Al in tap water is 36,000 ug/L. These unusual results require additional investigation.

7.6 Antimony (Sb). Exceedences of the MCL (6 ug/L) not discussed in the text include: IR08MW37A, -39A, -40A, -41A, -42A, IR09MW35A, -36A, IR09PO43A, PA33MW36A, -37A, IR38MW16A, IR39MW21A, PA50MW12A, IR71MW13A, and grab samples on IR22, IR33, and IR44. Also, many detection limits (DLs) > MCLs.

7.7 Chromium VI (CrVI). The text (Section 4.2.1.6) and Figure 4-7 use the aquatic criteria of 50 ug/L for delineating CrVI plumes. As noted above (General Comments), the California PHG for CrVI (.2 ug/L) should be used as a human risk-based criteria. DLs for CrVI are > .2 ug/L in every case. A data gap may exist for CrVI, because of the elevated DLs.

The comments below focus on CrVI, in lieu of total Cr--since recent results have confirmed that CrVI is responsible for Cr total hits and since CrVI is the component of total chromium which is associated with health risks.

7.7 Cobalt exceedences are noted in FS data tables (i.e., Parcel D Draft Final Feasibility Study, Volume II, Appendix C, Table C-5 and C-6: regarding exceedences of HGAL-adjusted screening criteria for protection of salt water aquatic life).

7.8 Cyanide exceedences are noted in FS data tables.

7.9 Copper (Cu). Exceedences of the aquatic criteria of 3.1 ug/L are not uncommon, especially in areas of highest concentrations adjacent to the bay margin (IR 22, IR33, IR53). Plumes should be drawn as exceedences of risk-based criteria. The text should discuss exceedences of risk-based criteria.

DLs are elevated > aquatic criteria in areas adjacent to the bay margin (IR22, IR53).

7.10 Iron (Fe). Fe was measured at 77,300 ug/L (and Al concentrations increased to 53,800 ug/L) in recent samples at IR34MW01A. The HGAL for Fe is 2,380 ug/L. The PRG for iron in tap water is 11,000 ug/L. These unusual results at IR34 require additional investigation.

7.11 Lead (Pb). Plumes should be drawn as exceedences of risk-based criteria. Exceedences of the aquatic criteria of 3.1 ug/L are not uncommon. The text should discuss exceedences of risk-based criteria.

7.12 Manganese (Mn). USEPA PRG for tap water for Mn is 800 ug/L. The only criteria used in this report is the HGAL at 8140 ug/L, which may not be conservative. The agencies may need to confer with their toxicologists regarding Mn in groundwater, and appropriate screening criteria.

Maximum exceedences of the PRG (800 ug/L) are not uncommon--over a wide area. And, Mn exceedences of the HGAL (8140 ug/L) occur over a wide area in IR67 (e.g., 29,600 ug/L at IR67MW04A). All Mn results are persistent. Maximum results in grab samples at IR22 (141,000 ug/L at IR22B011), with persistent results in IR22MW20A to 9300 ug/L.

7.13 Mercury (Hg). Hg results greater than criteria are not represented on tables and figures.

7.14 Molybdenum (Mo). Has data been screened for Mo exceedences? The HGAL for Mo is 61.9 ug/L. IR38MW03A has Mo at 300 ug/L. Include risk-based criteria for Mo. USEPA's reference dose and suggested no adverse effects response level (SNARL) for Mo in drinking water are 35 and 40 ug/L, respectively.

7.15 Nickel (Ni). Ni is not uncommon at concentrations > aquatic criteria (8.2 ug/L). The plumes to the N and S of Building 411 may be one continuous plume (IR09MW31A, IR09MW35A, IR09MW44A, IR09P043A and PA33MW37A). The Ni plume is persistent. While concentrations appear to be decreasing in N wells, they may be increasing to the W (IR38MW16A). Plume is poorly defined to W. No recent Ni data for any of the surrounding wells except N well IR09MW31A (latest results for other wells from 1991, 1994, 1996).

Plumes should be drawn as exceedences of risk-based criteria.

DLs are > aquatic criteria in areas where Ni is elevated (IR08, IR22, IR39, IR53)

Question: do any of the wells on Parcel D have stainless steel screens?

7.16 Selenium (Se). Has the data been screened against Se regulatory criteria (e.g., IR22MW16A)? HGAL for Se is 14.5 ug/L. Include risk-based criteria for

Se.

7.17 Silver. NAWQC (instantaneous maximum)for silver in salt water is 1.9 ug/L. DLs > NAWQC are noted, especially at IR22, at the bay margin.

7.18 Thallium (Tl). Tl is not uncommon at concentrations > MCL. DLs > MCL also not uncommon (e.g., IR08, IR22)

Tl and Mn are associated at IR 67 and IR34. Tl at IR34MW37B is listed on Figure 4-26 as ND on 2/01/01, but Table 4-2 shows 18.4. Please clarify which is the correct result.

7.19 Vanadium (V). Has the data been screened for V? The HGAL for V is 26.62 ug/L. IR33MW61A has V at 59.9 ug/L. Include risk-based criteria for V.

7.20 Zinc (Zn). The HGAL for zinc is 75.68 ug/L. The tap water PRG for zinc is 11,000 ug/L (this has not been exceeded at Parcel D).

The text notes that a nearby grab sample, collected bayward of the high hits, had a low concentration of Zn. Here (and elsewhere) in order for results of grab samples to be comparable, they must be taken from the same aquifer zone. Please confirm that grab samples for the remedial investigation (RI) borings which are cited in this report are taken from the first groundwater encountered (i.e., the A aquifer).

Results for IR34MW36B are shown on Figure 4-15 as A aquifer results. Results for other B wells (IR33MW121B, IR34MW37B) are shown on Figure 4-26 as B aquifer results. This is confusing. (And how about the bedrock wells?)

Given the problems with aquifer designation and well nomenclature noted above (comments on Section 3.2), it would be simpler to include all results for each analyte on Figures 4-1 through 4-25, and change figure titles accordingly. And, as requested above (General Comment 4), please provide another figure which shows all results from all paired wells.

7.21 Field Fe^{+2} and Mn^{+2} results should be tabulated and discussed. Sensitivity of these tests (and others) to DO readings, turbidity, and other parameters should be discussed and the data quality evaluated accordingly. Filtered and unfiltered field results should be compared. Field results and lab results should be compared.

For the following wells, Fe^{+2} and Mn^{+2} were indicated as analytes on Table 2-3, but are not indicated as analytes on sampling forms (and no results are provided on the sampling forms): IR09PPY1, IR09MW51F, IR34MW01A, PA50MW11A.

For the following wells, Fe^{+2} and Mn^{+2} were indicated as analytes on sampling forms, but no results were entered on sampling forms: IR33MW62A, -66A, and IR71MW03A, -12B.

7.22 Benzene. A plume should be drawn around IR09MW45F and -51F. Plume not defined to N.

Elevated DLs (generally 10 ug/L) > MCL (1 ug/L) at bay margin (IR22, IR17).

7.23 Carbon tetrachloride. A plume should be drawn around IR09MW45F and -51F. Plume not defined to N.

Elevated DLs (generally 5 or 10 ug/L) > MCL (.5 ug/L) at bay margin (IR22, IR17). DLs about 1 ug/L at IR34, IR38.

7.24 Tetrachloroethylene (PCE). A plume should be drawn around IR09MW45F (10 ug/L) towards adjacent well IR09MW52F (1 ug/L) and towards borings IR33B069 and -B116. Plume is not defined to N or W.

DLs (at 10 ug/L) > MCL (5 ug/L) at IR22 on bay margin.

7.25 Trichloroethene (TCE). Plume is not defined to N or W of IR09MW51F.

DLs (at 10 ug/L) > MCL (5 ug/L) at IR22 on bay margin.

7.26 Benzo(a)pyrene (b(a)p). DLs (at 10 ug/L) generally greater than MCL (.2 ug/L) everywhere (except IR08, parts of IR09). So extent of concentrations between .2 and 10 ug/L is not defined. No wells were analyzed for semi-volatile organic compounds (SVOCs), including b(a)p, in recent sampling events.

7.27 Bis(2-ethylhexyl)phthalate. A plume should be drawn at IR09MW45F, towards -51F. Not defined to N. The plume shown at IR09MW35A and 116A should not extend to IR09MW36A.

Are there QA/QC reports which evaluate whether this compound is a laboratory contaminant? Is this a soil contaminant?

7.28 Aroclor-1260. DLs everywhere (at .5 and 1 ug/L) > aquatic criteria (.03 ug/L). So extent of concentrations between .03 and .5 to 1 ug/L is not defined.

DLs (at 6 to 45 ug/L) exceed MCL (4 ug/L) at the bay margin (IR17, IR22, IR33) and at IR38.

7.29 Heptachlor epoxide. DLs everywhere (at .01 to .05 ug/l) are > aquatic criteria (.0036 ug/L). Highest DLs (.05 ug/l) at bay margin (IR17 and IR22).

7.30 Monitored natural attenuation (MNA). When will MNA results be presented and evaluated? It is recommended that any proposal regarding MNA be presented prior to the FS, to allow for agency review and comment.

7.31 Other exceedences. The text includes sections on selected contaminants. Exceedences of criteria for all contaminants should be discussed. Please provide a

figure which illustrates exceedences of other contaminants.

7.32 Site-Specific Potential Data Gaps

IR08. Extent of Sb > MCL is not defined to S (on Parcel E). Cu exceedences of aquatic criteria (3.1 ug/L, which is < HGAL of 28 ug/L) are not defined to S (on Parcel E). Cu has not been sampled since 1991. Tl DLs > MCL.

As, Be, Mn > PRGs. Cu, Mn identified as exceedences in FS.

IR08MW44A. Mn and Tl exceedences were not sampled since 1996. This plume would likely move to the N and NW (towards Pump Station A). Data on wells in these directions (Parcel E) is not presented, so the extent of contamination is not known. See notes on IR67.

IR09. CrVI plume is influenced by Pump Station A and probably by pumping at Dry Dock 4. The effect of pumping on deeper aquifers is not determined. Extent of CrVI in bedrock and deeper zones is not determined. CrVI was detected in deeper well IR09MW54B and in bedrock wells IR09MW51F and IR09MW45F. May need to install well(s) in deeper zones. In shallow zone, extent of CrVI is not defined to W and N (of IR09MW51F, IR09PPY1). Wells W of IR09MW39A, PA50MW12A, IR09MW35A haven't been sampled recently, so current extent of plume to W is not determined.

Ni is widespread and should be considered one large plume (see comments on Ni). Ni is a common contaminant in paired wells IR0935A/55B. Extent in deeper zone is not determined.

Cu and other metals in exceedence in the IR09 area should be included as analytes in deeper wells and bedrock wells.

Sb exceedences of MCL are not uncommon, and DLs > MCLs also not uncommon.

VOCs (benzene, carbon tetrachloride, TCE, PCE) were measured in bedrock wells IR09MW45F and 51F. The extent of VOCs especially to the N is not defined. Is the source identified? More hydropunches close to IR09MW45F and 51F, soil gas sampling, or more wells downgradient might be prudent, in order to rule out potential risks due to soil/water to vapor pathways.

Co, CrVI, Cu, cyanide, Ni, and V exceedences are noted in FS data tables in multiple wells.

IR09MWP043A. Mn is high and was not sampled recently: Ni and Tl in same well. All 3 metals should be included as analytes.

IR16. Ni and Tl had exceedences and mercury (Hg) was slightly above aquatic criteria, and PA16MW16A has not been sampled since 1996. For this well (and elsewhere) two sampling events (of three total) are about one month apart, which means they don't really qualify as separate events. Therefore, only two events (not three) can be counted. Similar situation for Tl , Zn exceedences in PA16MW17A and Hg in IR50MW14A. No information provided on adjacent Parcel E.

Mo exceedences are noted in FS data tables

IR22 and IR22MW20A. Ag, Cr, Cu, Mn, Ni, Pb, Sb, Tl, Zn were measured >

criteria near bay margin. May need to install another well downgradient to monitor for migration to bay. Very high metals concentrations in nearby boring IR22B011. (Has this boring been excavated?) Extent of contamination in deeper zones is not determined. May need to install well(s) in deeper zone.

CrVI likely exists above Ca PHG of .2 ug/L. CLP metals and CrVI should be analyzed for in this well and at side-gradient bay margin wells. When was this well sampled for mercury?

DLs elevated > criteria for several metals (e.g., Ag, CrVI, Sb, Ni, Tl) and for VOCs. So extent not clearly determined for concentrations between DLs and criteria.

As, Mn, Pb, V identified as exceedences in FS data tables.

IR33. Based on Cr total results, CrVI is likely above Ca PHG of .2 ug/L. Only one sampling at IR33MW61A occurred--in February 2001. Nearby wells not sampled recently for CrVI. Effect of pumping at Dry Dock 4 is not determined. Extent of CrVI in deeper zones is not determined. May need well(s) in deeper zones. Cu and other metals should be included as analytes in shallow and deep wells.

Co, Cu, Mo, Ni, V identified as exceedences in FS data tables.

IR33MW61A. Several metals exceed criteria (Al, As, CrVI, Cu, Ni, Tl).

VOCs > MCLs were benzene and ethylbenzene in this well and nearby boring IR33B069. Toluene and xylene also detected. Total petroleum hydrocarbons-diesel range and -gasoline range (TPH-d and TPH-g) were measured at 600 ug/L and at 1000 ug/L. The RWQCB should review the TPH results with respect to the Corrective Action Program (CAP) for petroleum releases.

Al was agreed upon as an analyte in the response to comments (R2C) but was not analyzed for.

IR33MW65A. The Navy provides no explanation for eliminating nitrate as an analyte.

PA33MW37A. See Ni comment.

IR34. Based on Cr total results, CrVI is likely above Ca PHG of .2 ug/L.

Extent of CrVI in deeper zones is not determined. Effect of pumping at Dry Dock 4 is not determined. May need well(s) in deeper zones.

Metals in exceedence in the area (Cu, Mn, Ni) should be included as analytes in deeper wells.

Cu, V, Zn identified as exceedences in FS data tables.

IR34MW01A. Al concentrations increased to 53,800 ug/L and iron was measured at 77,3000 ug/L in recent samples. Something unusual may be happening at this location. See notes on Appendix A. Ni poorly defined to S.

TCE close to criteria in this well and nearby IR34MW35A and IR34B021. All these samples are located along N side of B366. No samples taken inside B366. Is the source identified? Additional hydropunches or soil gas sampling might be prudent to rule out the soil/water to vapor pathway.

IR34MW36A and B. Ni is common to both wells. Ni, Tl and Zn are common

between two "B" wells IR34MW36B and 37B, and should be analytes for shallow wells. Effect of pumping at Dry Dock 4 is not defined.

IR34MW36B. For sulphate (at 1,640,000 ug/L), the extent is not defined.

IR34MW37A and B. Ni, Mn and Tl are common to both wells. The extent of metals in deeper zone is not defined. The effect of pumping at Dry Dock 4 is not defined. For Zn exceedences in deeper well, extent is not defined.

IR34MW37A. Mn at 10,400 and 12,100 ug/L was measured in two recent events. Extent is not defined. A spider box should be added to Figure 4-10 for this well. Correct the maximum cited in text (Section 4.2.1.10).

IR36. Cd, Co, Cu, Mn, Zn identified as exceedences in FS data tables.

IR36MW16A. Several metals are in exceedence (Al, Sb, Mn, Ni, Tl), with no sampling since 1996. This plume would likely move to the N and NW (towards Pump Station A). No data on wells in these directions (Parcel E) is presented, so the extent of contamination is not known. See notes on IR67.

PA36MW03A. Exceedences of Cu (366 ug/L) and Zn (1,340 ug/L). This well is not on Table 4-2 or on the figures.

IR37. Ni identified as exceedence in FS data tables.

IR38. Several metals are in exceedence (Mn, Ni, Tl at IR38MW01A, and Tl, Zn at IR38MW02A, and Mo at IR38MW03A), with no sampling since 1996. This plume would likely move to the N and NW (towards Pump Station A). No data to N of IR38MW01A (Parcel E) is presented, so the extent of contamination is not known. See notes on IR67.

Mo, Mn, Zn identified as exceedences in FS data tables.

IR39. Aroclor, ethylbenzene, heptavhlor epoxide and phenanthrene identified as exceedences in FS data tables.

IR44. Cd identified as exceedences in FS data tables

IR50MW14A. Hg was in exceedence in 1994. Two NDs in 96 (only one month apart, so this counts as one event). Not sampled since 1996.

PA50MW05A. Lead exceedence in 1993, resampled in 1995 and 1996 (PB was ND), not sampled since. Arsenic (As) continues to be in exceedence. Extent is not defined to W (on Parcel E).

PA50MW07A. Mo exceedence noted in FS data tables.

IR53B028. Was TPH measured at this location or in this area, along with the phenanthrene exceedence, in current or historic events?

IR67. Mn exceedences at IR67MW04A, IR36MW16A, IR38MW01A, IR08MW44A were not defined to W (on Parcel E), and were not sampled since 1996. This plume would likely move to the N and NW (towards Pump Station A). No data on wells in these directions (Parcel E) is presented, so the extent of contamination is not known. Need to consult with risk assessors on Mn in groundwater. Other metals in same wells are Ni, Tl, Cd: extent to W not defined.

Mn, Zn identified as exceedences in FS data tables.

IR70. Cadmium exceedence near bay margin (IR70MW12A) not defined to E. May need another well to E to monitor potential migration to bay.

Cd, Mo, Zn identified as exceedences in FS data tables.

IR71. Zn exceedences measured in grab samples, surrounding wells were not sampled recently except in wells to E. May need to consider possible threat to bay.

VOCs measured include carbon tetrachloride, TCE, PCE, DCE, MTBE and methane. Seems like few data points for a VOC area (only one shallow well within the building, only three grab samples outside building). More hydropunches close to IR71MW03A, soil gas sampling, or more wells downgradient might be prudent, in order to rule out potential risks due to soil/water to vapor pathways.

IR71MW03A and 12B. Acetone (50 ug/L) was measured in the deeper well, but not in shallow paired well. Source and extent of acetone is not determined. Acetone at this depth is not expected. Is this a lab contaminant?

IR71MW12B is screened into a deeper zone than, say IR33MW121B. A sandy zone from about 50 to 71' bgs has not been screened.

8.0 Section 5.0: Evaluation of Data Quality Objectives (DQOs)

8.1 Section 5.1: Well Condition Survey and Repair. The text says (last line page 5-1): "If surface contamination was observed entering the well casing, the well was assessed and either redeveloped or decommissioned and replaced, as appropriate." Please identify which wells were observed having surface contamination entering the well. Which wells were replaced? The Current Condition column on Table 2-1 should indicate replacement wells for decommissioned wells.

8.2 Error. Page 5-1, second bullet. Change "may reflect..." to "may not reflect..."

8.3 Additional comments provided under Table 2-1.

Tables

1. Table 2-1: Well Construction Information and Current Conditions

1.1 Decommissioned wells. It was DTSC's understanding that wells for decommissioning would be proposed to agencies prior to decommissioning activities. Why was this process not followed? 5 wells have been decommissioned (IR08MW39A, IR08MW43A, IR09MW31A, PA16MW16A, PA33MW36A). Were any wells replaced? If not, why not? If so, how is this recorded in the table?

A rationale for decommissioning and the replacement wells should be noted as such in the Current Conditions column. If the Navy intends to not replace the decommissioned wells, this should be discussed in the report.

Wells that are replacement wells should be renamed, so as to not confuse the record. For example, Table 2-1 notes that PA35P01A is a new piezometer installed by IT in February 2001. However, the log indicates that PA35P01A was installed by HLA on 12/15/92. For simplification, an indicator "X" can be added to the name for replacement wells, as in PA35P01A*X*.

Well logs for all replacement wells should be provided.

Include decommissioning logs in the well condition report.

Decommissioned wells should be surveyed.

1.2 Well Report. DTSC has previously requested that the Navy prepare a Well Report to include all wells on Hunters Point. For the Well Report and for the revised data gap report, please revise/expand Table 2-1 to include the following information for each well on Parcel D: dates/methods of installation/decommissioning, contractors, total depth, screen material, well diameter, size of screen opening, length/materials of filter pack, length/materials of seal, range of water levels measured, length of silt trap. finish details (e.g., vault, Christy box, standpipes), presence/depth of NAPL.

All well logs should be included as an appendix to the Well Report.

1.3 The Current Condition column of the Tables 2-1 should continue to be updated and included in future reports. Notes and comments from groundwater sampling data sheets should be updated in the Current Conditions column. This idea has not been fully actualized as yet. More discussion on well problems are provided in comments on Appendix A.

1.4 Please provide information on the current condition of the following wells for which "no information" was cited in the Current Conditions column: IR08MWW-6*, IR08P39A, IR09P040A, IR17P12AA, IR17P12AB, IR22P15A1, IR22P15A2.

1.5 No well screen information is provided for IR08MWW-6*. What is the date of installation of the well and the contractor? Why is there no well log? Information on screened interval can be obtained in the field by using a down-hole video camera.

1.6 Well IR08MW37A has not been sampled because it needed redevelopment. As noted in previous correspondence, DTSC does not agree with the Navy's decision rule which says that if a well needs redevelopment, it will not be redeveloped and sampled.

1.7 Please confirm that all wells on Parcel B are listed on Table 2-1.

2. Table 2-4: Groundwater Sampling Results, February 2001. Please explain qualifier "UJ" (usually applied to VOCs). That is, if "U" is "not detected" at the concentration indicated and "J" is "estimated" at the concentration indicated, is "UJ" an estimated detection limit?

Include units for salinity.

Wells should be in alpha and numerical order (as in Table 4-20). For example why are IR33 "B" wells listed before IR33 "A" wells?

3. Table 3.1: Vertical Hydraulic Gradient Calculations

In order to assess whether vertical gradients are persistent, or exhibit any pattern, the table should be expanded to include vertical gradients from previous measurement events.

Error. The note says that bolded numbers are discussed in the text. However, the numbers quoted in the text for several pairs are different from those bolded in the table, as follows (text quotes in parentheses): IR09MW31A/54B (.019 only), IR09MW35A/55B (no values quoted in text), IR34MW36A/B (.026, not .022/.029), IR37MW01A/26B (.026).

4. Table 4-1: Groundwater Screening Criteria

4.1 Incomplete criteria. This table is incomplete. Since the list of screening criteria is incomplete, some exceedences and some compounds have been screened out. As a result, tables and figures are also incomplete.

Screening criteria should be no less conservative or complete than remedial action objectives already proposed in site documents.

Please expand this table to include all contaminants detected in Phase I and II investigations, and in RI investigations.

Include regulatory criteria (and HGALs, if applicable) for all contaminants. For example, several metals (Mo, Se,V), methyl tert butyl ether (MTBE), nitrate, nitrite, and sulphate have human health and/or aquatic criteria which should be included. Include screening criteria for total petroleum hydrocarbons (TPH) and total dissolved solids (TDS), tap water PRGs (which were used for RI screening), and the California PHG for CrVI. Appropriate criteria for compounds which have no MCL or NAWQC should be discussed with the regulatory agencies.

Include ranges detected for each contaminant on the table.

4.2 Please correct all tables and figures after revising this table. Include all data points from previous investigations.

4.3 Add a footnote that HGALs for the B aquifer have not been developed. Were HGALs for the A aquifer applied to the B aquifer?

4.4 An HGAL should be provided for aluminum.

4.5 Error. Footnote b is incomplete. It is cut off at "...was available, the U.S."

5. Table 4-2: Groundwater Sampling Results Exceeding Regulatory Criteria

5.1 Incomplete data set. All results greater than criteria in Phase II are not shown. For example, sulphate (1,640,000 ug/L) and barium (3,880 ug/L) exceed MCLs but are not included. RI exceedences are not all included. For example, PA36MW03A is not included on this table or on figures.

Criteria are not provided for all compounds, which resulted in some compounds being screened out, and as a result exceedences have been excluded from this table.

All exceedences of HGALs are not included.

Please check data (current and historic) for completeness and revise this table (after revising Table 4-1).

When DLs are above criteria, please include results in this table. For example, antimony at IR09P040A has a DL of 14.3 and the criteria (MCL) is 6. These results should be shown on this table.

5.2 Change title to "screening criteria" instead of "regulatory criteria", and correct footnote as well. (The title page says "screening criteria".)
5.3 Errors/typos
IR09MW35A. Two identical entries are provided for most dates--please delete duplicates.
IR09MW45F and 51F. All VOC exceedences are not shown on this table.
IR34MW01A. Aluminum result is not shown (<28.4 ug/L on 2/8/01).
IR34MW36B. Sulphate at 1,640,000 ug/L is not included.
IR34MW37A. Manganese result not shown (12,100 ug/L on 2/8/01). Sulphate not shown (498,000 ug/L).
IR37MW01A. 2 rows are provided for nickel--please combine.
IR39MW33A. Discussed on text but not on this table. Barium at 3,880 ug/L. Please confirm that other barium exceedences have been reported.
Please include all exceedences from current and historic investigations (e.g., PA36MW03A).

6. Tables 5-1 to 5-4: Evaluations of Data Quality Objectives

DTSC's disagreements regarding the data quality objectives, and in particular, the decision rules, have been noted previously and are not repeated here.

Table 5-3. The text should differentiate more clearly between Parcel D work and basewide work. For example the phrase "19 new nested A and B aquifer pairs" does not refer to Parcel D. Please state the number of wells on Parcel D (A and B) and the number of well pairs on Parcel D that were used during the data gaps investigations.

Figures

1. Decommissioned wells. Figures should distinguish decommissioned wells from current wells by the use of a symbol and by using half-tone format for well names. Similarly, an indicator that the well no longer exists should be provided on tables of water level measurements and chemical analytical results.

2. Figures showing the total dissolved solids (TDS) results for both aquifers should be included.

4. Figure 2-1: Site-Wide Monitoring Well and Piezometer Locations

4.1 Well IR09MW31A is indicated as decommissioned on Table 2-1 but is shown as a sampling well on this figure. Please clarify the current condition of this well.

4.2 Were all wells used for sampling also included in the water level measurement program? If so, the legend for the red symbols should read: "Wells Used for Sampling *and* Water Level Measurements". And, the legend for the yellow symbols should read: "Wells Used for Water Level Measurement *Only*". If

some of the sampling wells (but not others) were used for water level measurement, another symbol should be designated for "Wells Used for Sampling but not Used for Water Level Measurements".

5. Figure 3-1: Hydrogeologic Cross Section Map

5.1 The following wells are not indicated as cross section wells on Figure 3-1, but are included on the cross sections in Figure 3-2: A-A' (IR09MW35A, IR71MW03A), B-B' (IR09MW31A, IR34MW36B, IR34MW37A, IR37MW01A), and C-C' (IR33MW121B). Please change symbols on Figure 3-1.

5.2 No symbol was provided for IR33MW121B.

5.3 Wells IR02B100, IR09B005, and IR33MW121B are indicated as a cross section wells on this figure but, in fact, do not appear on any cross section.

5.4 Please add parcel names, to help orient the reader.

6. Figure 3-2: Hydrogeological Cross Sections A-A', B-B' and C-C'

6.1 General comment. The hydrogeological cross sections should be revised. Soil types on logs (especially percentages quoted) should, in general, be transferred directly to the cross sections. A comprehensive QA/QC review by Tetra Tech of the revised cross sections is recommended.

6.2 Stratigraphic column. The geologic time period should be noted. Also, please include bedrock.

6.3 The symbol for bedrock should be added to cross sections and legends .

6.4 Please include the point(s) of intersection of the cross sections (e.g., the intersection of A-A' with C-C').

6.5 Projection artifacts. Some points have been projected more than 200 feet to the cross sections. This is perhaps too far for the heterogenous site geology and for the strong relief of the bedrock contact. For example, the significant change in slope at the bedrock contact between IR34B023 and IR34MW37A and B is likely an artifact of the long projection.

6.6 Water level changes associated with pumping (at Pump Station A and Dry Dock 4) should also be indicated (or queried where unknown). For example, is the depth to groundwater maintained below mean sea level (MSL) at Dry Dock 4?

6.7 Soil types

The percentages of gravel, sand, silt, and clay are frequently cited on the logs. If only two soil types are represented in the cross sections (e.g., gravel/clay, sand/silt), then the two soil types with the highest percentages should be consistently used on the cross sections.

In the comments below the soil type with highest percentage is noted first, and second soil types are noted for 15% or more. For example, a soil with 55% sand, 20% clay, 15% gravel, 10% silt is noted as sand/clay

How are "shells" interpreted as soil type? That is, is % shells considered as % gravel, since shell fragments are generally of gravel size? If so, then a soil with

55% sand, 20% clay, 15% gravel, 10% shells should be noted as sand/gravel.

The symbol for gravel looks like gravel and sand. Please change to gravel only (so it can be combined with clay, say, as well as sand).

Boulders are noted on logs and in the text but are not shown on the cross sections. Add a symbol for boulders and show on cross sections as appropriate. How is the boring log designation "boulder fill" interpreted (i.e., boulder/sand, boulder/clay, etc.)? Also, add a symbol for cobbles.

The reviewer was not able to discern consistency in the Navy's interpretation of mixed soil types on the cross sections. Some mixed soil types are shown (e.g., sand/silt), and some are not shown (e.g., silt/clay).

For example, Bay Mud is shown as clay (and is noted on some logs as 80 - 95% clay). But, in general, Bay Mud is about equal percentages of clay and silt with some fine sand (as noted in the text). So, Bay Mud should be denoted by the mixed soil type "clay/silt" when the log is not specific. But, when indicated more specifically on logs as "clay", "silty clay", "sand", the specific soil type should be shown on the cross sections.

Also, it is not clear what the criteria are used for representing a mixed soil type with a predominant percentage as a single soil type. For example, obviously a soil 80% sand with 5% or so of other soil types can be shown as sand only. But how about 60% sand and 30% silt, or 70% sand and 25% silt? Or 50% sand, 25% clay, 25% silt?

On the cross sections, it is not possible to distinguish between high and low percentages in mixed soil types. For example, sand/clay (i.e. clayey sand) is not distinguishable from clay/sand (sandy clay). The Navy may wish to adjust symbols for mixed soil types to allow for these distinctions.

6.8 Discrepancies

Multiple differences/errors on the cross sections were noted with regard to agreement between logs and cross section. Some of these errors are related to the problems with symbols and mixed soil types mentioned above. And, some of the following may not be errors but, instead, may be interpretations based on other logs which were not cited or included. Of course, some differences due to interpretation are to be expected.

The following list notes some discrepancies between logs and cross sections and is not complete (e.g., cross section A-A' was not fully reviewed). Depths in feet below the ground surface (' bgs) are estimated.

IR02MW101A. 1.5' - 8' bgs is silt/sand or silt/gravel (not silt).
IR02MW102A. 1.5' - 8' bgs is silt/sand or silt/gravel (not silt). 18.5' - 25' bgs is clay/sand (not clay).
IR02MW147A. No well screen.
IR02MW149A. No well screen. 0' - 4.5' bgs is silt/sand (not silt). 4.5' - 19.5' bgs is clay/sand (not clay).

IR08MW44A. 0' - 3.5' bgs is sand/gravel (not sand).
IR09B020. 0' -4' bgs is gravel/cobbles (not gravel). 4' - 7' bgs is boulders (not gravel). 7' - 10' bgs is silt/gravel (not silt). 14' -18' bgs is gravel/silt (not silt).
IR09B022. 3.5' - 5.5' bgs is sand/gravel (not sand/clay). 5.5' -14.5' bgs is clay/sand (not clay). 14.5' - 19' bgs is gravel/clay (not gravel). 19' - 23' bgs is clay/sand (not clay). 23' - 30' bgs is silt/sand (not silt). 30' - 31' bgs is sand (not silt). 31' -34' bgs is grave/sand (not clay/sand).
IR09B025. 0' - 5' bgs is gravel/silt (not gravel). 5' - 9' bgs is silt/clay (not silt). 11' 14' bgs is gravel/clay (not gravel).
IR09B026. Qbm is interpreted for the log entry "light olive brown poorly graded sand with clay" Quus may be more appropriate. 3.5' 13.5' bgs is gravel/clay (not gravel).
IR09MW37A. 9'-13.5' bgs is sand/silt or sand/gravel (not silt).
IR09MW39A. 5' -14' bgs is clay/sand (not clay).
IR09MW54B. "Clayey sand" at 13' to 30' may be Quus (not Qbm).
IR09MW55B. 14.5' - 22.5' bgs is clay/sand (not clay). 22.5' - 29' bgs is clay/sand (not clay). 32' - 33' bgs and 37' - 38' bgs is clay/sand (not clay).
IR09P042A. 4' -9.5' bgs is clay/sand (not clay). 9.5' - 10.5' bgs is gravel/clay (not gravel). 10.5' - 15' bgs is clay/gravel (not clay). 15' - 18' bgs is gravel/clay (not gravel). 34' -37' bgs is sand (not clay). 44' - 47' bgs is clay/sand (not clay).
IR22B006. 0' - 2' bgs is sand/gravel (not sand). 2' - 8.5' bgs is gravel/sand (not sand).
IR13B008. 12' - 15.5' bgs is gravel/sand (not sand/silt). 19' - 22' bgs is clay/sand (not clay).
IR22B009. 0' - 7' bgs is sand/gravel (not sand). 7' - 10' bgs is sand. 21' - 24.5' bgs is sand/gravel (not clay). 31.5' - 35' bgs is sand/gravel (not sand). 36.5' - 41.5' bgs is sand/gravel (not sand). 41.5' - 47' bgs is clay/sand (not clay).
IR22B010. 0' - 15' bgs is clay/sand or clay/gravel (not clay). Terminates in Quus (not Qbm).
IR22B012. 0' - 5' bgs is sand/gravel (not sand). 5' - 9.5' bgs is gravel/sand (not gravel). 15' - 24.5' bgs is sand/gravel (not sand)- or, to 33' bgs is sand/gravel if shell is considered to be gravel).
IR22B014. 1.5' - 16' bgs is clay/gravel (not clay). 31' - 42' bgs is clay/sand (not clay).
IR22B015. Well screen erroneously shown for this boring. 0' - 3' bgs is sand/silt (not silt). 3' - 5.5' bgs is gravel/silt (not silt). 5.5' - 10.5' bgs is clay/sand (not clay).
IR22B017. 0' - 2' bgs is sand/gravel (not clay). 2' - 9' bgs is sand/clay (not clay). 41.4' - 44.5' bgs is clay/sand (not clay).
IR22B018. 0' - 4' bgs is clay/sand (not clay). 6' - 19' bgs is clay/sand (not clay), 42' - 43' bgs is clay.
IR22MW07A. 21' - 22' bgs is clay/sand (not clay). 22' - 29' bgs is sand/gravel (not sand/silt)

IR22P15A1. Well screen missing on cross section. 0' - 9' bgs is sand/silt (not silt).
IR33MW121B is shown at two locations Figure 3-1. Please correct. 8' - 12' bgs is clay/gravel (not clay). 60' - 62' bgs is clay/sand or clay/gravel (not clay). 62' - 74' bgs is gravel/clay (not gravel/sand). 75' 77.5' bgs is gravel/clay (not gravel/sand).
IR34B020. 1'-5' bgs is clay/sand (not clay). 9'-13' is sand/gravel (not sand/clay).
IR34B022. .5'-4' bgs is sand/gravel (not sand/clay).
IR34B023. 0'-4.5' bgs is gravel/silt (not gravel/sand). 4.5'-15.5' bgs is gravel/clay (not gravel/sand). 15.5'-20' bgs is clay or clay/sand (not silt).
IR34B024. 0'-4' and 6'-18' bgs is sand/gravel (not sand/silt). 4'-5' bgs is sand/clay. 5'-6' is clay (not silt). Terminates in sand (not silt/sand).
IR34B028. Terminates in sand (not sand/clay).
IR34MW36A. 6'-10' bgs is gravel/clay (not gravel/sand). 10'-15' bgs is clay/gravel (not clay) and Fill (not Qbm). 15'-18' bgs is gravel/clay (not silt/sand). 18-' 20.5' bgs is clay/sand (not silt/sand).
IR34MW36B. 17'-30' bgs is sand or sand/clay (not sand/silt).
IR34MW37A. Terminates in clay (not clay/sand).
PA35P01A. 0'-25.5' bgs is gravel/silt (not gravel/sand).
IR38MW01A. 0' - 2' bgs is gravel/sand (not sand/clay).
IR38MW02A. 0' - 5' bgs is sand/gravel (not sand/silt).
IR38MW03A. 12.5' - 14.5' bgs is clay/sand (not clay).
IR39B010. 1.5' - 10.5' bgs is clay/sand (not clay). 14' - 20' bgs is clay/sand (not clay).
IR39B027. .5' 4.5' bgs is sand/clay (not sand).
IR39MW33A. 13.5' - 18.5' bgs is clay/gravel (not clay).
IR45B025. 0' - 7.5' is sand/silt or sand/gravel (not sand/clay). 7.5' - 14' bgs is sand/clay or sand/gravel (not sand).
IR50B021. 1.5' - 4.5' bgs is clay/sand (not clay). 8.5' - 13.5' bgs is clay/sand (not clay).
PA50MW06A 1.5' - 3' bgs is clay/sand (not clay).
IR70B009. Quus is shown underlying the termination of the boring. Which logs is this interpretation based on?
IR70MW11A. Terminates in clay (not Quus sand).
IR71MW03A is shown at two locations on the cross section (no log provided).
IR71MW12B. 15' - 24' bgs is clay/sand (not clay) 65' - 69' bgs is gravel/clay (not gravel sand).

6.9 Other errors/typos

The relative positions of IR37MW26B and IR37MW01A are reversed from their positions on Figure 3-1. Similarly, please correct relative locations of IR39B009, IR13B008 and IR39B010.

On C-C', a well screen is shown for boring IR22B015, and the nearby piezometer IR22P15A1 is shown without a well screen. Similarly, no well screens

are shown for IR02MW147A and IR02MW149A.

In the area near IR09B026 and IR09MW39A, the stratigraphic interpretation is not consistent between cross sections A-A' and B-B'. For example, the aquifer designation is different and Qbm is interpreted at the termination of IR09MW39A and IR09B026 on B-B' (but not on A-A'). On A-A', Quus is interpreted at the termination of both wells.

The water level indicator is not shown for all B wells. What is the indicator for F wells?

The legend should say "queried (?)" where uncertain (not "dashed (?)"). Note that none of the contacts are either queried or dashed. Please add uncertainty indicators where appropriate.

The two light blue colors used to designate the A and B aquifers are not distinguishable.

7 Figure 3-3: A Aquifer Groundwater Elevation Contour Map, February 14, 2001

7.1 Please add a note to the figure indicating that water levels were measured at low tide.

7.2 Is the depth to groundwater pumped below mean sea level (MSL) at Dry Dock 4? What is the lowest depth associated with the pumping?

To clarify that the dry dock is not filled with water, the blue color on the figure should be changed.

Please include the location of the pump station for Dry Dock 4.

7.3 Tidal zone. The tidal zone should be indicated. The date of measurement of tidal influence should be cited. Wells used for tidal influence measurements during this event should be indicated by a symbol. The tidal effect was not as widespread as previous measurements indicated. Is this a possible seasonal effect? Or, was the criteria for this event less conservative than the criteria used in past events?

7.4 Repairs. Several areas of water line repairs are indicated. Water line breaks were previously postulated as causes for anomalously high water level readings. Have flow patterns changed pursuant to repairs? A table should be provided listing the location of the repair and the date, so that the chronology of repairs can be compared to contour maps from different measurement events.

8 Figure 3-4: Comparison of Tide to Groundwater Elevations in Wells IR22MW07A and IR22MW16A. This figure is missing.

9 Figures 4-2 through 4-41.

9.1 Grab groundwater samples. Results of grab samples are shown for some compounds (e.g., Sb, As, Ba, Cd, Cu) and not others (e.g., Cr, CrVI) on the figures. Please revise figures to include all sampling results.

The note: "Locations without associated data are those for which no data

for [here the analyte is filled in] exist." is misleading when data are excluded (e.g., Cr, CrVI).

9.2 Please add a note saying that groundwater flow directions indicated are those measured at low tide, February 2001.

10. Figures 4-27 through 4-41 present data separately for 3 time frames: <2000, Phase I data gap investigation (2000), and Phase II data gap investigation (2001). Contemporaneous plumes for 2000 and 2001 events are shown. However, the 2000 and 2001 plumes are not directly comparable to the "<2000 plumes" because 1) the <2000 "plumes" are not delineated by contemporaneous data and 2) many fewer data points are used for the 2000 and 2001 plumes. This style of data presentation may create the impression that plumes have decreased or disappeared, when in fact the data sets are not fully comparable (because all points with detections have not been resampled). For example, if Mn results are compared for the three time frames, it appears that a large Mn plume has disappeared, when in fact wells not sampled in 2000 and 2001 include the wells with highest concentrations in the "<2000 plume".

Appendix A: Groundwater Sampling Data Sheets

1. Well problems. Well problems identified in the field should be recorded on Table 2-1 (Current Conditions column), and corrective measures identified. This was not consistently (or comprehensively) done in the table. For example, a "poor well seal" was noted on the data sheet for IR09MW31A. This information should have been transferred to Table 2-1. Instead, Table 2-1 notes that the well was "Decommissioned" but does not give reason or date of decommissioning. Another example: the data sheet for IR09MW35A says "Pink paint inside casing @ 9'2" (February 1, 2001), and Table 5-1 says "Inspected April 2000; vault repaired Jan 2001". Was the pink paint addressed? Was the paint present before and/or after the vault replacement? Did paint impact the results (exceedences of Cr, CrVI and nickel)?

2. Well problems cited on data sheets. Please provide updates on the following wells, by revision of Table 2-1 as indicated above.

IR09MW31A. "Poor-Dirt, rust. Poor well seal."
IR09MW35A. What is the source of the "Pink paint inside the casing @ 9'2"? How did the paint get into the casing?
IR09MW54B. "No lock, replace lock, swelled bentonite removed from area around casing". This note indicates that the problem of "no lock" was addressed in the field. However, the "swelled bentonite" suggests a further problem with the well seal. Has this problem been addressed?
IR09PPY1. "Z in well, wood lid cut out, Plastic bag protecting cap." Table 2-1 notes: "Redeveloped by IT Jan 2001, no screening info". This well is discussed in

the text (page 5-2) which says that a video log was used to confirm that roots were growing into the well through the well screen and that, nonetheless, the well appeared to be in good condition. This process should have been summarized on Table 2-1. What does "Z" signify in the note? The length of screen, depth of screen etc. should have been obtained during video logging and recorded on Table 2-1, and the phrase "no screening info" deleted. Please confirm that a locking cap has been installed on the well.
IR17MW11A. "Good-PVC Cap w/ no locking system over well."
IR17MW12A. "Rusted."
IR17MW13A. "Roots on DO meter after reading"
IR22MW15A. "note: brown roots"
IR34MW01A. "Soft gooey bottom, too turbid for field Fe^{2+} and Mn^{2+} tests. Well should be revisited before resampling." Notes say "muddy red-brown" and "opaque red-brown". Very high Al has been measured at 16800 mg/L (1996) and 53800 mg/L (2000). Something unusual seems to be happening here that warrants further investigation.
IR34MW37A. "Very Good-No Lock". Please confirm that this well is now locked.
IR37MW26B. "No lock, hole in PVC piping." Please confirm that this well is now locked. What does it mean "hole in PVC piping"? Where exactly is the hole?
IR38MW03A. "Good little Brk of Rust/some Standing water". Please explain.

3. The sampling sheets are typed, not hand-written. Was the data entered into a data base in the field or have the sheets been typed subsequent to the field work? All sheets should be signed.

4. Discharge rates of 200 ml/min are noted in several wells incorrectly--for example, IR009MW54B, -55B, IR34MW36B, IR51MW26B. For these wells, and other wells, discharge rates calculated (from gallons of water removed/time) are much greater than 200 ml/min.

5. Sampling rates (with bailers, generally) are indicated as 200 ml/min. The R2C noted that sampling for volatile organic compounds (VOCs), including TPH would be conducted at 100 mL/min, as per the recommendations of Puls and Barcelona.

6. Backup equipment. In some cases, it seems that the readings are in error. This issue was brought up by DTSC in our previous correspondence. Please ensure that the field crews have backup equipment, in case of equipment failure.

For example, not infrequently, dissolved oxygen (DO) readings exceed saturation (e.g., IR22MW16A, IR34MW36A/B (initial readings), IR50MW15A, IR71MW03A, etc.) and turbidity readings are very high, suggesting possible equipment malfunctions. (Alternatively, this may be due to sample collection

method or other field conditions.) As noted in previous correspondence, high DO readings may negatively impact other results (e.g., MNA results).

7. Filtering

For several wells, specific metals or CLP metals analysis was indicated but the sampling form does not show that filtering equipment was used. These include: IR09MW31A, -51F, -55B, -09PPY1, IR22MW08A, -16A, -20A, IR34MW36B, -37B, IR37MW26B, IR70MW11A.

Filtering apparatus was indicated for mercury (Hg) at PA16MW18A. Is filtering appropriate for Hg analysis? Similarly, were CrVI samples filtered?

Filtering apparatus was specified for several wells which were analyzed for total dissolved solids (TDS) only (e.g., IR17MW11A, -12A, -13A). Were these samples filtered?

In the R2C, the Navy indicated that for Fe^{+2} and Mn^{+2}, filtered and unfiltered samples would be used for comparison if turbidity readings were high. Since no duplicates are indicated on the sampling forms, this process was not followed. As previously indicated, high turbidity may compromise field results for these metals.

Appendix B: Chain of Custody Forms

1. Turnaround time/remarks section. It appears that some of the remarks have not been successfully copied, since there are "x"s and "/"s in this section without accompanying text. It looks like a stamp (perhaps in a color that doesn't xerox) may have been used. Please instruct Curtis and Thompkin (C&T) lab to use inks that can be xeroxed.

Similarly, COCs that went to Severn and Trent (S&T) are difficult to read. Please instruct the field crew to use inks that can be xeroxed.

The COCs to S&T note that "all metals are field filtered". However, all sheets which have metals analyses do not indicate that metals were filtered in the field. Please instruct the field crew to note on COC forms which metals are filtered in the field.

2. The S&T lab log-in sheet for sample delivery group number 81552 says "Sample received with broken bottles" and refers to an attached sheet "for discrepancies". Please provide the attached sheet.

Appendix C

1. Geophysical logs were not included.

2. Logs were not included for the following wells/borings: IR02B291, IR09MW31A, IR09MW35A, IR22MW02A, IR33MW66A, IR34MW36A, IR37MW01A, IR71MW03A, IR71MW121B.

Appendix D: Historic Water Levels and Groundwater Elevation Contour Maps

1. The water level information should be combined into a single table which shows historic and current levels on a well-by-well basis.

Attachment

1. IR34MW36A. During the step drawdown tests, water levels dropped to within the screened interval of the well.
2. The hydraulic conductivity lab report for IR34MW37B is missing.

eh:ack:hpp

dgwdg.wpd07/18/01